A.I.A. FILE NO. 23-E TERRAZZO DATA AND SPECIFICATIONS
(New Number)
NATIONAL TERRAZZO AND MOSAIC ASSOCIATION, INC.

THE SYMBOL OF QUALITY
NATIONAL TERRAZZO & MOSAIC ASSN. INC.
INCORPORATED 1901
NEW JERSEY
FOR FINE TERRAZZO PATRONIZE OUR MEMBERS

INFORMATIONAL KIT

containing full

DATA and SPECIFICATIONS

on

TERRAZZO AND MOSAICS

by

NATIONAL TERRAZZO AND MOSAIC ASSOCIATION

1420 New York Avenue, N. W.

Washington, D. C.

NATIONAL TERRAZZO AND MOSAIC ASSOCIATION, INCORPORATED

The Purposes and Aims of this Association are:

1. To increase the use of terrazzo and mosaic by architects, owners, general contractors, and the building industry in general through educational and promotional methods.

2. To obtain, disseminate, and exchange among the members accurate information regarding all matters conducive to the improvement of conditions within the industry; to promote harmony in the relations between employer and employee in the industry; to promote friendly relations among those engaged in the industry; and in general to do all things necessary and proper to carry out the foregoing statements.

3. To see that all persons using terrazzo and mosaic shall receive the best workmanship and materials on their projects so as to insure the best service, beauty, and wear that our product can give, and to serve as a court of last appeal on any questions arising between owner, architect, or builder and the terrazzo contractor concerning terrazzo and mosaic work.

By these purposes the National Terrazzo and Mosaic Association hopes to carry out its slogan of "To Serve the Users and Producers of Terrazzo." In our opinion architects, general contractors, and owners may be assured of better terrazzo and mosaic work when such work is executed by contractors who are members of this association and who have the authority to use the Association label: "The Symbol of Quality."

TECHNICAL DATA AND SPECIFICATIONS FOR TERRAZZO AND MOSAIC WORK

THE NATIONAL TERRAZZO & MOSAIC ASSOCIATION, INC.

1420 New York Avenue, N. W., WASHINGTON, D. C.

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Terrazzo is a type of Venetian marble mosaic using Portland cement matrix. Its extremely durable surface retains the beauty and versatility of marble mosaic in a full range of colors and any desired design. Although centuries old, terrazzo is a thoroughly modern architectural floor finish that is widely used in almost every type of building.

Five Reasons Why You Will Want Terrazzo

1. **Economy**—Initial cost *plus* no repairs . . . no replacement . . . minimum upkeep over a period of years for Terrazzo equals—usually is less than initial cost *plus* repairs . . . and replacements . . . and higher upkeep for other types of floors.

2. **Comfort**—Finished Terrazzo is *easy to walk on.* It is less slippery than any waxed surface. Furthermore Terrazzo can save you enough money to acousticate your ceiling thus giving you a *very low noise level.*

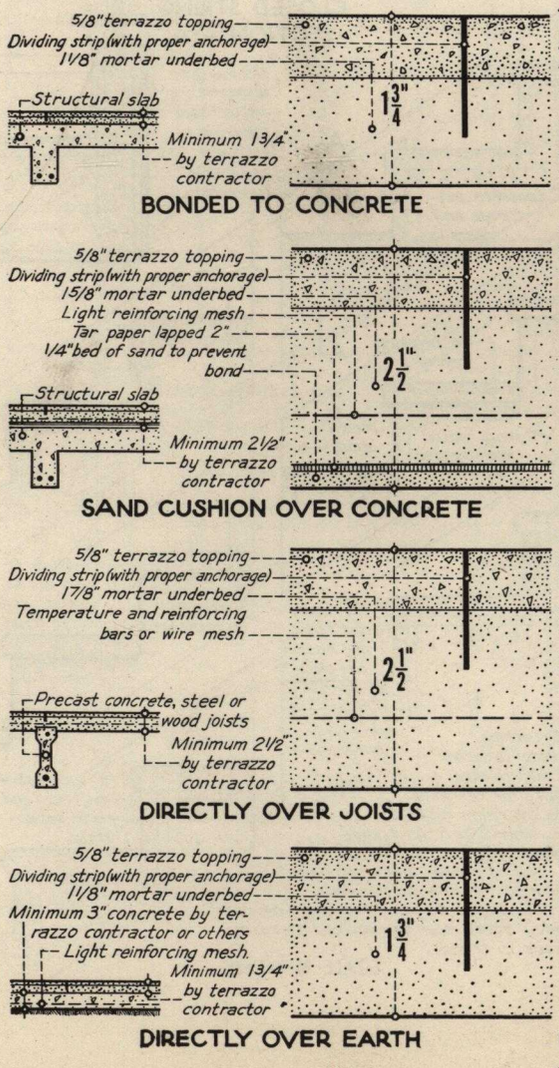
3. **Cleanliness**—Terrazzo can be sealed to be practically non-absorbent. Its smooth, jointless surface *cleans easily* . . . can harbor no accumulation of macroscopic or microscopic germs. It is aseptic.

4. **Color and Design**—Terrazzo has warmth and beauty. You may specify *any design* you wish—pictorial or geometric—in virtually *any combination of colors.*

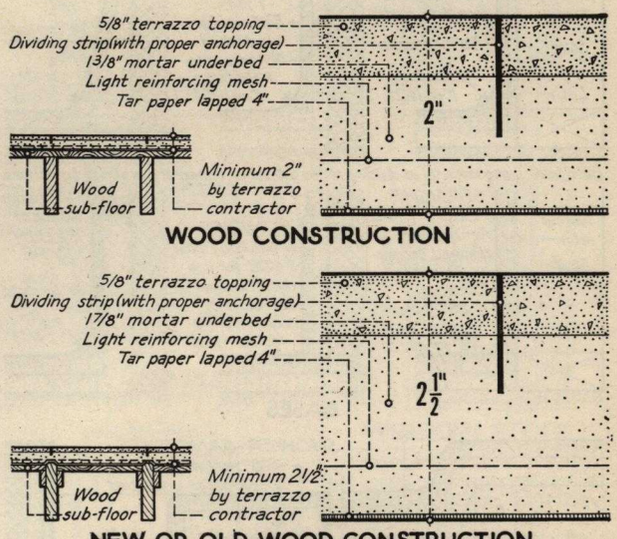
5. **Dependable Installation**—This Association's objective is to see that your Terrazzo installations *turn out exactly as you want them.* Write us for full information on any of the above points.

Terrazzo is of course widely used for floors, base and borders, but it is also both utilitarian and decorative when designed for use in stairs, treads, partitions, indoor skating rinks, outdoor dance floors and sidewalks, as well as for wainscot and wall surfaces.

TERRAZZO FLOORS


5/8" terrazzo topping
Dividing strip (with proper anchorage)
1 1/8" mortar underbed
Structural slab
Minimum 1 3/4" by terrazzo contractor
1 3/4"
BONDED TO CONCRETE
5/8" terrazzo topping
Dividing strip (with proper anchorage)
1 5/8" mortar underbed
Light reinforcing mesh
Tar paper lapped 2"
1/4" bed of sand to prevent bond
Structural slab
Minimum 2 1/2" by terrazzo contractor
2 1/2"
SAND CUSHION OVER CONCRETE
5/8" terrazzo topping
Dividing strip (with proper anchorage)
1 7/8" mortar underbed
Temperature and reinforcing bars or wire mesh
Precast concrete, steel or wood joists
Minimum 2 1/2" by terrazzo contractor
2 1/2"
DIRECTLY OVER JOISTS
5/8" terrazzo topping
Dividing strip (with proper anchorage)
1 1/8" mortar underbed
Minimum 3" concrete by terrazzo contractor or others
Light reinforcing mesh
Minimum 1 3/4" by terrazzo contractor
1 3/4"
DIRECTLY OVER EARTH

Terrazzo topping-200 lbs. marble granule to not less than 100 lbs. white or gray portland cement. Mortar underbed 1 cement: 4 sand
Dividing strips to be indicated on plans and/or specified to show: 1). Depth: (1 1/4" is standard). 2). Gage or face thickness
3). Material: Brass, White Metal (zinc or nickel silver) or composition 4). Spacing and arrangement.



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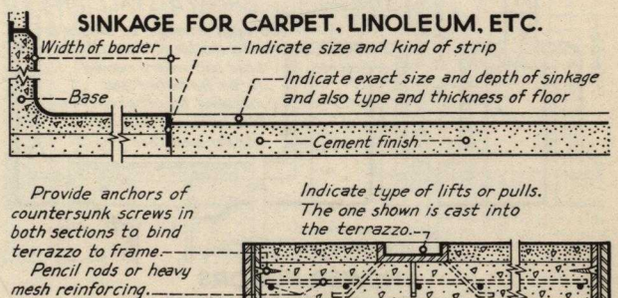
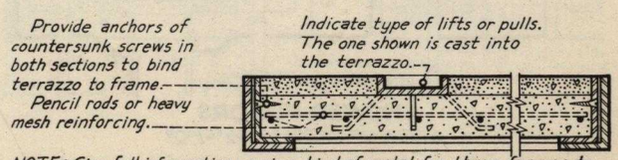

SINKAGE FOR CARPET, LINOLEUM, ETC.
Width of border
Indicate size and kind of strip
Indicate exact size and depth of sinkage and also type and thickness of floor
Base
Cement finish


Provide anchors of countersunk screws in both sections to bind terrazzo to frame
Pencil rods or heavy mesh reinforcing
Indicate type of lifts or pulls. The one shown is cast into the terrazzo.

NOTE- Give full information on size, kind of metal for these frames to be furnished and set by the terrazzo contractor.

TRENCH COVER

THE NATIONAL TERRAZZO & MOSAIC ASSOCIATION, INC.

SPECIFICATIONS FOR TERRAZZO WORK

METHODS—*NOTE: Two methods are used in laying terrazzo floors over concrete construction. One is to bond it to the structural slab; the other to separate it, as illustrated on Page 1.*

When the first method is used, the concrete fill is provided for elsewhere, and should be left at least 1¾ in. below the finished floor. This concrete fill can be made of cement, sand, and hard coal cinders in proportion of 1:1:6. Soft coal cinders must not be used. Slag, broken stone, or gravel are good aggregates for concrete fill under terrazzo floors. Before the terrazzo contractor installs his underbed, he must see that this concrete fill is thoroughly cleaned of plaster droppings, wood chips, and other debris. He should thoroughly slush it with neat cement grout to insure a good bond.

The second method is used in buildings where cracking is anticipated either from settlement, or expansion and contraction, or vibration. In this case, the terrazzo contractor carries his work from the structural floor slab up. This method requires a total thickness of at least 2½ in. The concrete slab is covered with a thin bed of dry sand over which a sheet of kraft or tar paper is laid. Over the paper, the underbed is installed as in the first method; except that coarser aggregate, such as cinders or fine gravel, can be used in the underbed where its thickness exceeds 2½ in. When this method is used, the cracks originating in the structural slab terminate at the sand bed and are not likely to appear on the finished surface.

When terrazzo is used over wood floors, a thickness of not less than 2 in. is required and the following procedure should be followed:

First, cover the wood floor with tar paper. Over this paper, nail a reinforcing wire fabric. Then, proceed to lay the concrete underbed as specified under the second method.

UNDERBED—The underbed for terrazzo, consisting of one (1) part Portland cement, and four (4) parts coarse screened sand, shall be spread and brought to a level not less than ⅝ in. below the finished floor.

STRIPS—Into this underbed, while still in a semi-plastic state, install dividing strips. These shall be 1¼ in. deep and have proper anchoring features; or preassembled decorative units may be used. Strips shall form borders and divide the fields into panels——x—— in size, or as shown on the drawings.

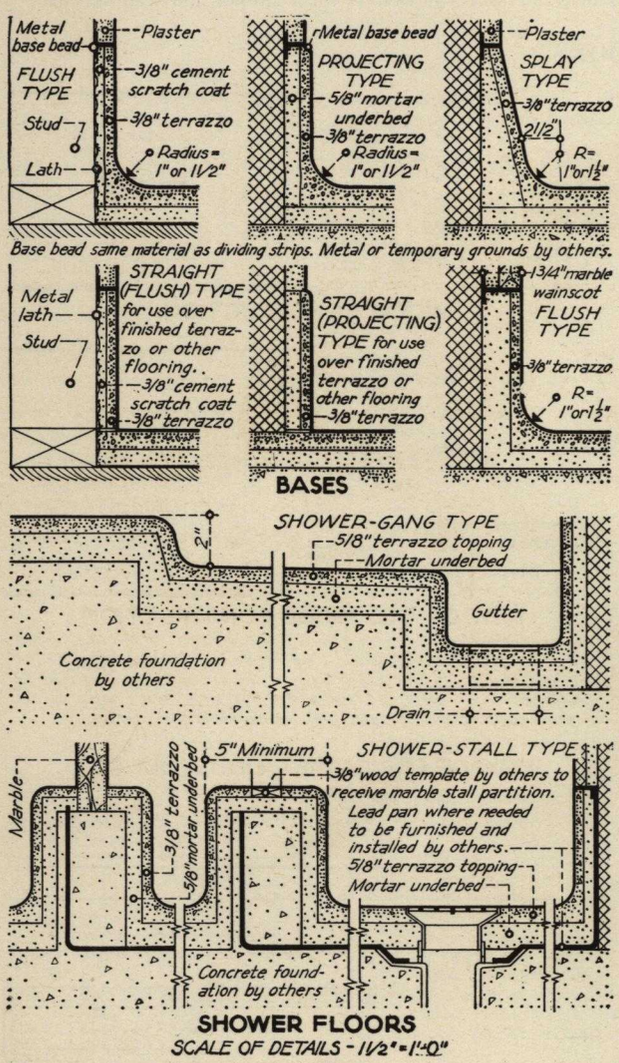
NOTE: The strips most commonly used are of half-hard brass. Other non-corrosive metals such as zinc alloy and nickel-silver are suitable. The thickness of the strip should be named using Brown and Sharpe gauge. Metal strips less than ⅛ in. thick are made of uniform thickness for their entire depth. Strips ⅛ in. thick or more are of the "heavy top" type having the top member not less than ⅜ in. deep. Composition strips can be used when colored strips are desired.

TERRAZZO—The terrazzo topping shall be not less than ⅝in. in thickness, and shall be of granulated marble of colors to be specified by the architect. The topping shall be uniform in composition, and the same marble granule that appears on the surface shall be used for its entire thickness.

The granule shall be of such proportions of size Nos. 1-2-3 as shall hereafter be determined. Samples of the terrazzo shall be made, in duplicate, for approval by the architect.

NOTE: Name the color of marble granule to be used, and whether domestic or imported. Consult our Terrazzo Palette Catalog for color combinations, etc.

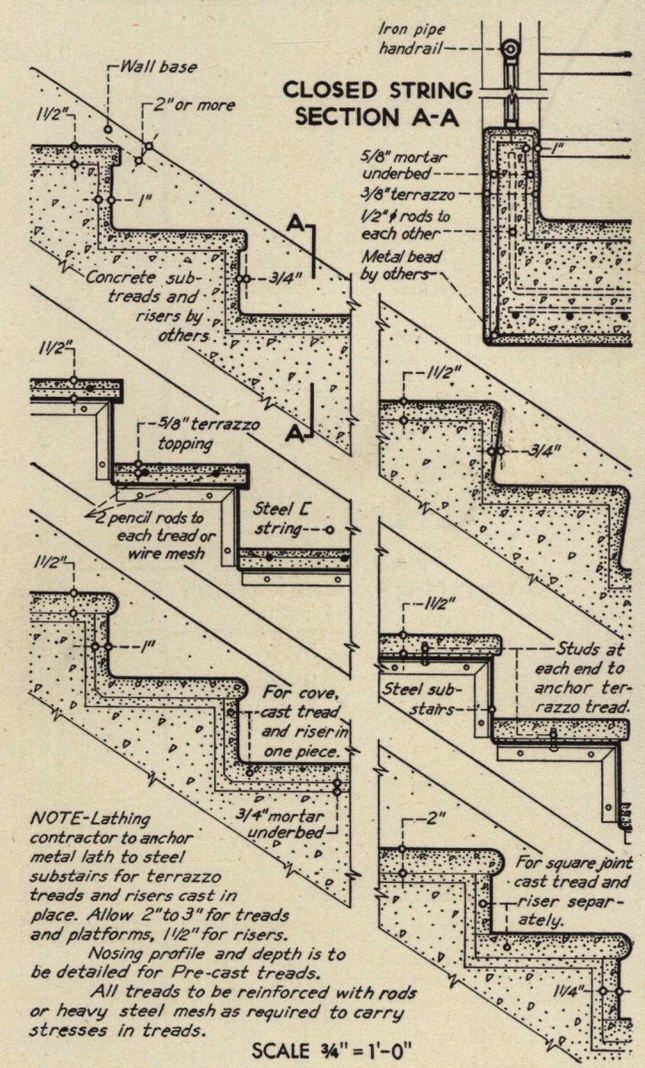
TERRAZZO BASES AND SHOWER STALLS



SHOWER FLOORS

SCALE OF DETAILS - 1 1/2" = 1'-0"

TERRAZZO STAIR CONSTRUCTION


Iron pipe handrail
Wall base
2" or more
1 1/2"
1"
CLOSED STRING SECTION A-A
5/8" mortar underbed
3/8" terrazzo
1/2" ϕ rods to each other
Metal bead by others
Concrete sub-treads and risers by others
3/4"
5/8" terrazzo topping
2 pencil rods to each tread or wire mesh
Steel C string
Steel sub-stairs
Studs at each end to anchor terrazzo tread.
For cove, cast tread and riser in one piece.
3/4" mortar underbed
For square joint cast tread and riser separately.
2"
1 1/4"
NOTE-Lathing contractor to anchor metal lath to steel substairs for terrazzo treads and risers cast in place. Allow 2" to 3" for treads and platforms, 1 1/2" for risers.
Nosing profile and depth is to be detailed for Pre-cast treads.
All treads to be reinforced with rods or heavy steel mesh as required to carry stresses in treads.

SCALE 3/4" = 1'-0"

MIX—Composition for terrazzo mixture shall be in the proportion of two hundred (200) pounds of marble granule to one hundred (100) pounds of Gray or White Portland cement, mixed dry. Add water after the mixing to make the mix plastic but not flowing. Where the cement is to be colored to obtain a desired shade, the color pigments shall be lime-proof and of a non-fading quality.

INSTALLATION—The mix shall then be placed in the spaces formed by the dividing strips and rolled into a compact mass by means of heavy stone or metal rollers until all the superfluous cement and water is extracted; after which, it must be hand troweled to an even surface, disclosing the lines of the strips on a level with the terrazzo filling. The finished surface shall show a minimum of 70% marble granule.

CURING—The floor must be kept moist for the next six (6) days at least, by sand, paper, or curing mats.

SURFACING—When, in the judgment of the terrazzo contractor, the floors have set sufficiently hard, they shall be machine rubbed, using No. 24 grit or finer abrasive stones for the initial rubbing. They shall then be resurfaced using a No. 80 grit or finer abrasive stone, after which a light grouting of neat Portland cement of the same kind and color as the matrix shall be applied to the surface filling all voids. The grouting shall remain until the time of final cleaning.

FINISHING—Floors shall have the grouting coat removed by machines, using a stone not coarser than No. 80 grit. This cleaning or fine-stoning shall not take place sooner than seventy-two (72) hours after the floor has been grouted, after which it must be washed thoroughly and left in condition acceptable to the architect.

WARNING—Acids are injurious to terrazzo and should not be used.

NON-SLIP FLOORS—Ramped or other surfaces in terrazzo floors so specified, are to be made non-slip by the addition of an abrasive aggregate.

For heavy duty floors, the proportion shall be two (2) parts of abrasive to three (3) parts of marble granule and the abrasive aggregate shall be mixed in the terrazzo topping for its entire thickness. For light traffic floors, the abrasive shall be sprinkled on the surface only, so that the approximated 70% aggregate surface in the finished floor is three (3) parts marble granule and one (1) part abrasive aggregate.

TERRAZZO BASE, ETC.—Where shown on plans or specified, provide a base ——— inches in height, coved at the floor to ——— radius, the top projecting ¼ in. beyond the line of finished plaster.

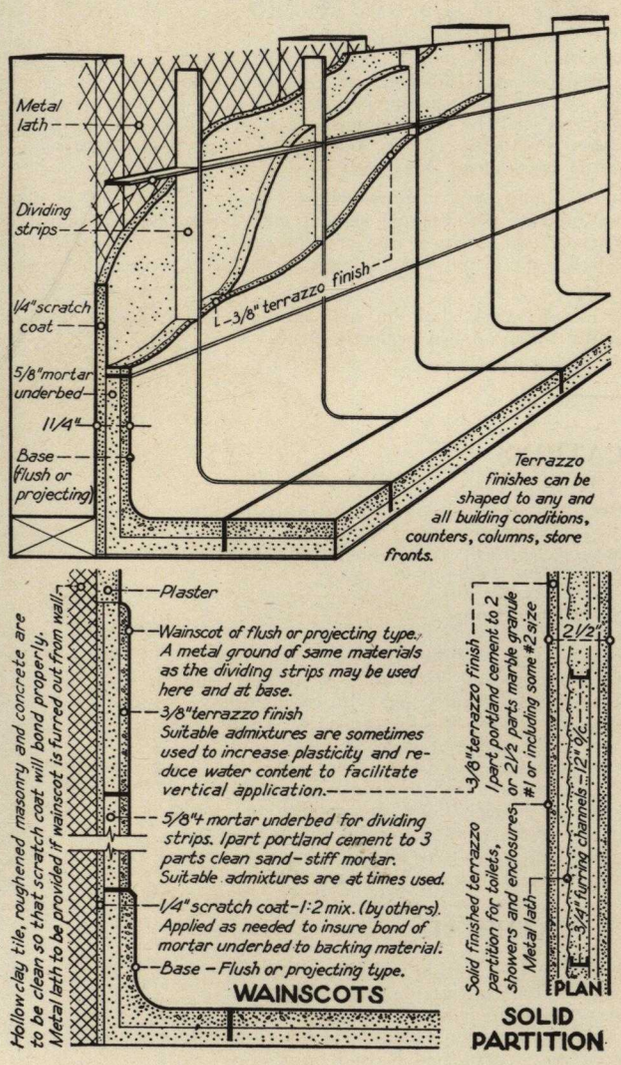
NOTE: If base is required without projection at top, specify it to be set flush with the finished plaster. Metal base screeds or any temporary grounds are furnished and set by others, and should be specified under another heading.

Base shall be divided into sections not exceeding five (5) lineal feet, using base dividers of B. & S. gauge No.——. The walls back of the base shall have a scratchcoat of cement and sand mortar brought to a line ⅜ in. back of the finished face of the base, into which the base dividers shall be set.

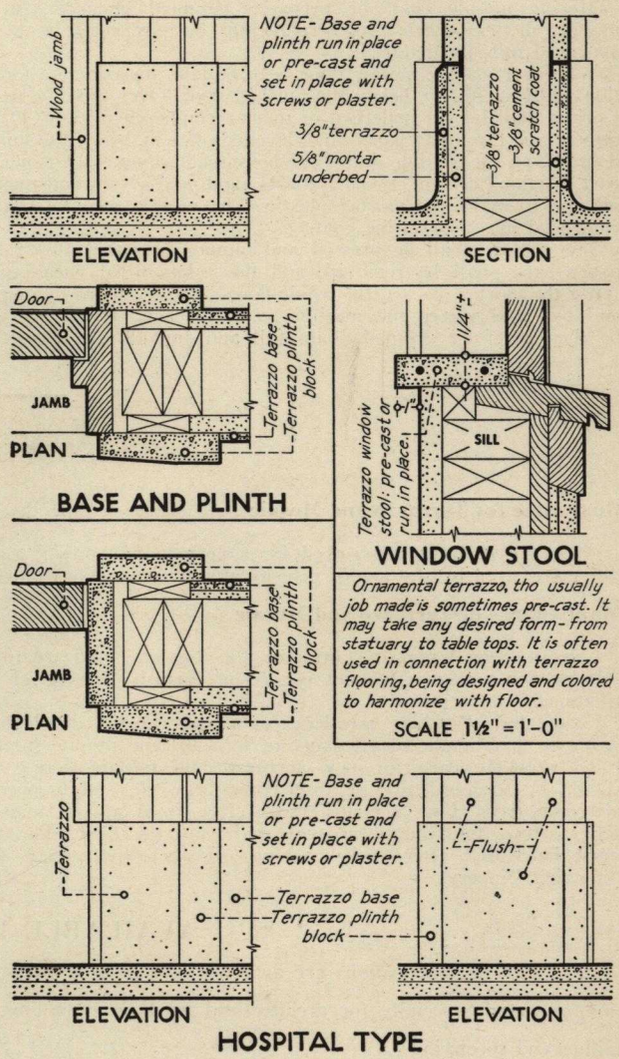
NOTE: If base is to be applied against wood or metal studding, metal lathing must be provided for under lathing specifications.

The surfacing and grouting of terrazzo base shall be done in all respects as described above for the floor. Base shall be finished

TERRAZZO WAINSCOTS AND PARTITIONS


Metal lath
Dividing strips
1/4" scratch coat
5/8" mortar underbed
1 1/4"
Base (flush or projecting)
3/8" terrazzo finish
Terrazzo finishes can be shaped to any and all building conditions, counters, columns, store fronts.
Plaster
Wainscot of flush or projecting type. A metal ground of same materials as the dividing strips may be used here and at base.
3/8" terrazzo finish
Suitable admixtures are sometimes used to increase plasticity and reduce water content to facilitate vertical application.
5/8" mortar underbed for dividing strips. 1 part portland cement to 3 parts clean sand - stiff mortar. Suitable admixtures are at times used.
1/4" scratch coat - 1:2 mix. (by others). Applied as needed to insure bond of mortar underbed to backing material.
Base - Flush or projecting type.
Hollow clay tile, roughened masonry and concrete are to be clean so that scratch coat will bond properly. Metal lath to be provided if wainscot is furred out from wall.
WAINSCOTS
3/8" terrazzo finish
1 part portland cement to 2 or 2 1/2 parts marble granule #1 or including some #2 size
2 1/2"
12" o/c
3/4" furring channels
Metal lath
Solid finished terrazzo partition for toilets, showers and enclosures
PLAN
SOLID PARTITION

TERRAZZO DOOR TRIM AND WINDOW STOOL



with a very fine stone, so as to leave the surface at a hone finish. Specifications should state whether terrazzo plinth blocks are required, and whether moulded or plain.

TERRAZZO STAIRS—Where terrazzo stairs are shown or specified to be built upon a concrete slab, the concrete contractor shall form the rough concrete work so as to allow 1½ in. from the top of rough concrete to the top of finished terrazzo tread, and 1 in. from the face of rough concrete riser to finished terrazzo riser.

The rough concrete for strings and curbs shall be so placed by the concrete contractor, as to allow 1 in. for the scratchcoat and finished terrazzo.

Where steel stairs are installed to be finished with terrazzo, same are to be covered with metal lath securely anchored to steel sub-stairs by the lathing contractor, allowing for terrazzo at least 2 in. on the tread, and 1½ in. on the riser. Platforms are to be treated in the same manner, allowing not less than 2 in. for terrazzo and setting bed.

On pan-type stairs where treads only are to be of terrazzo, 1½ in. shall be allowed for terrazzo and setting bed.

Pan treads and platforms must be well reinforced with steel pencil rods. Thickness of terrazzo topping shall be ⅝ in.

NOTE: Refer to description and details of terrazzo stairs on page 2.

NON-SLIP WORK—Treads, Platforms, and Landings shall be made non-slip by mixing 40% abrasive aggregate with 60% marble granule. Colors of marble granule and abrasive aggregate to be as selected.

TERRAZZO WAINSCOTS—Under another heading, walls that are to be finished with terrazzo are prepared with a scratchcoat of Portland cement and sand to within 1 in. of finish. Where wall surfaces are of an absorbent material, the plasterer shall use waterproofed cement with the sand for the scratchcoat.

The terrazzo contractor shall apply his setting bed mortar over the scratchcoat to within ⅜ in. of the finished face. This shall be composed of one (1) part cement and three (3) parts sand.

Dividing strips No.——— gauge shall be inserted in the setting bed forming bases and caps and dividing the dado into sections, all as shown on the plans. The terrazzo finish shall then be applied, pressed, and troweled plumb and true.

Terrazzo wainscot shall finish flush with plaster above or project ——— inches beyond same as shown on plans. Terrazzo wainscot shall be machine rubbed and brought to a smooth hone finish (or to a polished finish).

TERRAZZO PARTITIONS—Metal lath construction shall be provided by metal lath contractor as follows: Erect forms of metal studding placed not over 12 in. c. to c. and securely fastened at corners, at walls, and over openings; and well bedded into floors. This framing shall be covered with galvanized expanded metal lath.

Plaster contractor shall apply to the metal lath a scratchcoat of one (1) part Portland cement and two (2) parts screened sand, plumb and true, to within 1 in. of the finished face.

Upon surfaces thus prepared, the terrazzo contractor shall apply and install the setting bed and terrazzo finish.

The finished thickness of partitions shall not exceed 2½ in.

Terrazzo partitions shall be machine rubbed and brought to a smooth hone finish (or to a polished finish).

SPECIFICATIONS FOR MOSAICS

Marble mosaic shall be prepared mounted on paper in the mosaic shop. Patterns and ornamental designs shall be as per approved full-size details.

Wherever marble mosaic floor is to be laid, the concrete foundation will be left 2 in. below the finished floor. Over this, the mosaic worker shall lay an underbed of mortar composed of one (1) part cement and three (3) parts sand, levelled off 1 in. below the finished floor. Then the setting coat shall be spread, composed of one (1) part Portland cement, two (2) parts sand, and a sufficient quantity of lime to make the mortar plastic. The mosaic tesserae shall be embedded into this setting coat.

The mosaic shall be pressed and tamped into the mortar. The paper back shall be removed, and the joints filled with cement. After the mortar has set, the whole floor shall be rubbed by machine and by hand where the machine cannot reach. The joints shall be then carefully grouted again full and smooth. At completion, clean the floor and deliver the work with a smooth hone finished surface.

Glass mosaic for mural decoration shall be prepared on paper in accordance with designs and cartoons, furnished or approved by the architect, in a manner similar to that specified for marble mosaic, and shall be set in a mastic composed of a mixture of one (1) part Portland cement, and one (1) part lime putty, and three (3) parts clean sharp sand.

The scratchcoat for glass mosaic work shall be of a good quality mixture of Portland cement and screened sand applied to the surface and given a fine cross scratch by plaster contractor who shall leave a uniform thickness of ¾ in. to receive the mosaic work.

All mosaic work shall be well grouted. Glass mosaic shall be left natural and washed perfectly clean.

GENERAL SPECIFICATIONS

Guarantee for Terrazzo and Mosaic

All work shall be guaranteed for a period of one year against defects caused by the use of inferior materials or workmanship.

Maintenance of Terrazzo and Mosaic

Consult your terrazzo contractor for "sealers" and treatments suitable for terrazzo. Do not use resin, varnish or tung-oil base treatments on terrazzo.

Soaps and scrubbing powders containing caustic alkali should never be used in the maintenance of terrazzo and mosaic surfaces.

To properly care for new terrazzo and mosaic floors, they should be scrubbed two or three times a week, and mopped on alternate days. Use a neutral soap, free from alkali, acids, or other strong ingredients, as they may ruin the floor. The floor must be rinsed after each washing, so as to prevent it from becoming slippery.

After two or three months of this treatment, the floor will acquire a beautiful natural sheen, and will require less work for its upkeep. Consult the Association's bulletin "Terrazzo Maintenance".

Working Conditions

The following facilities are to be provided free of charge to the terrazzo and mosaic contractor to enable him to carry out his work most economically and with efficiency:

Space for storing his materials and equipment.
Water, light, and heat above freezing point.
Use of elevator or other hoisting facilities and gangways.
Electric power and maintenance of 110 and 220 Volt with connections on each floor, or at least on alternate floors.
Rubbish caused in doing his work will be collected by the terrazzo contractor and placed where designated on each floor, for removal and disposal by others.

AVAILABLE REFERENCE MATERIAL

The following publications are available free from the Association, prepared especially for architectural needs in designing, detailing and specifying:

Divider Strip Location and Data Bulletin.
Terrazzo Palette Catalog and Formulas.
Terrazzo Maintenance Bulletin.
Reducing Explosion Hazards in Operating Rooms.
Terrazzo Streamlined Bath Room.
Resiliency Tests.

See Our Catalog in Sweet's

TERRAZZO Streamlined BATHROOM

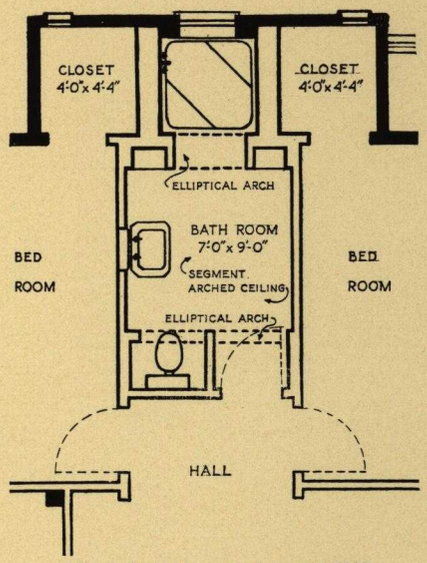
THE NATIONAL TERRAZZO & MOSAIC ASSOCIATION, INC.

1420 New York Avenue, N. W., WASHINGTON, D. C.

Strikingly illustrated below, is this bathroom with finished walls and floor of Terrazzo on metal lath. Gray marble granules in a base of cream colored Portland cement creates the pleasing mottled effect of the walls, and floor and cap mould are done in the same warm tone of gray marble.

Rubbed to a smooth hone finish, the terrazzo provides sanitary, vermin-proof, enduring surfaces that require no costly maintenance, and the curved floor base makes the daily cleaning for the housewife truly "something to sing about". Head, sill and jambs of terrazzo also make practicable the window in the square bathtub recess.

As shown by the pictures below and the floor plan at right, the walls are hollow partitions constructed of metal lath on ¾-inch steel channel studs. A 2½-inch floor slab was poured on ⅜-inch rib metal lath, and the tastefully curved plaster ceiling is suspended metal lath construction.



Metal Lath News, August, 1939

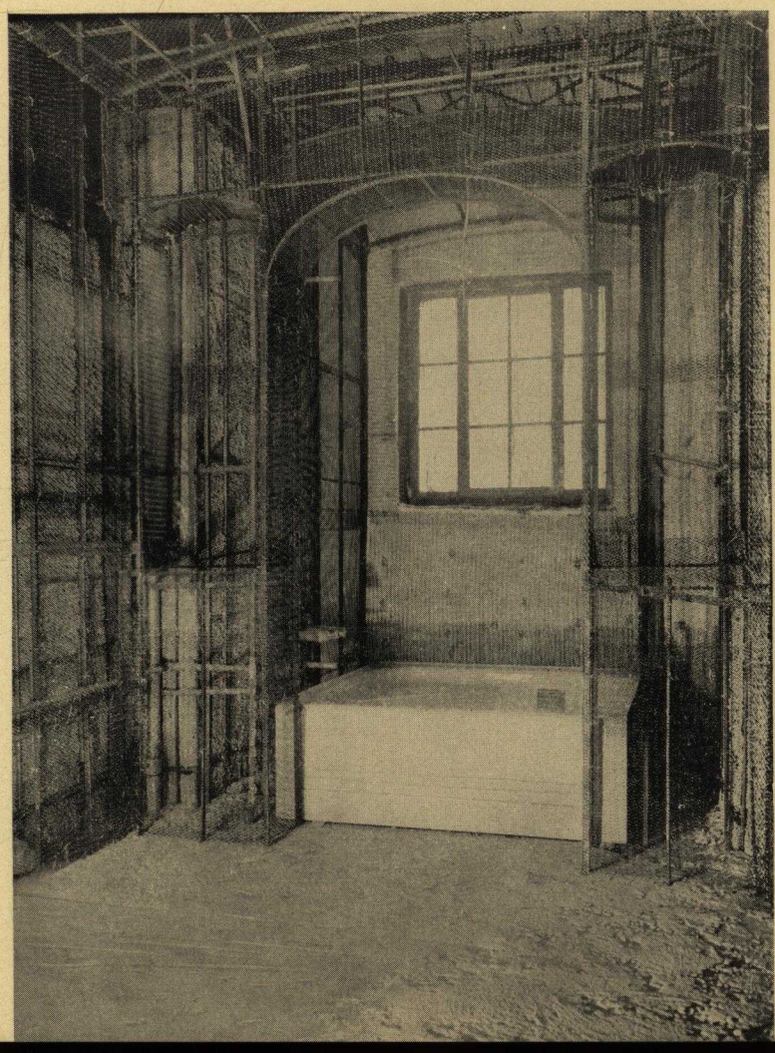
DURING CONSTRUCTION

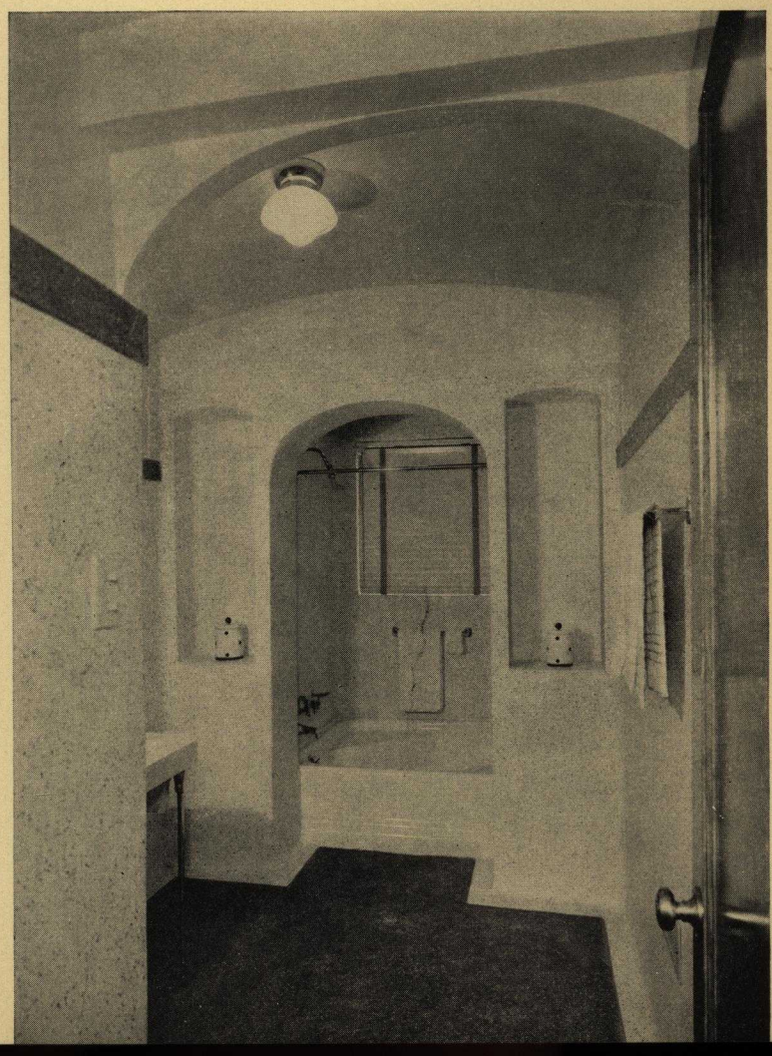
The creations and effects possible with terrazzo on metal lath are countless, for these flexible, plastic materials know no bounds of form. It is a construction well worth investigating.

Details of the proper application of terrazzo on metal lath for walls, floors and partitions are given in "Technical Data and Specifications for Terrazzo and Mosaic Work."

COMPLETED BATH

Bathroom in residence of Earl J. McMahon, Long Beach, Indiana. Charles H. Lenske and J. Raymond LaThomus, Associate Architects.





OUTDOOR TERRAZZO

THE NATIONAL TERRAZZO & MOSAIC ASSOCIATION, INC.

1420 New York Avenue, N. W., WASHINGTON, D. C.

GENERAL OUTLINE FOR INSTALLATION

A. I. A. File No. 23-E (New Number)

TERRAZZO is well adapted for outdoor usages including such areas as walks, terraces, dance floors, tennis and shuffleboard courts, and bowling alleys. All of these types of installations have been made and proven satisfactory. In the case of the bowling alleys it is desirable to use a very hard marble chip and to have the bottom screed and marble fused into one slab to overcome the difficulty of pitting caused by inexperienced bowlers lofting their balls.

For these outdoor installations the procedure outlined below should be followed:

"The concrete foundation slab should be designed with due consideration for frost hazard, drainage, and structural strength. Two inches is a suitable thickness allowance above this slab for the terrazzo work which should be entirely bonded to the structural slab. The use of mastic or prepared felt expansion joints is governed by the same consideration given in other types of pavements except that where it is desired to conceal such joints double divider strips or metal expansion joints are used in the terrazzo topping directly above the mastic joints. Divider strips of either metal or plastic should be used to form panels not larger than 3'-0" on a side.

It is advisable to select a marble granule that will weather; some marbles have better weathering characteristics than others. All mortar colors must be pure mineral pigments because of the action of the sunlight. Terrazzo should be given a proper sealing treatment on completion. Such a treatment is inexpensive and may be repeated each year. It is desirable to protect these outdoor installations in winter with a paper membrane and straw or dirt covering. If, after a few years, the terrazzo becomes dull, an entirely new surface can be created by a relatively inexpensive regrinding.

This terrazzo work is done in accordance with standard practice, but special consideration must be given to the items of joints, marble granule, pigment, and sealing that are more important in outdoor work because of the action of the elements.

Some notable outdoor installations are:

Canal Street, New Orleans, 750,000 square feet;

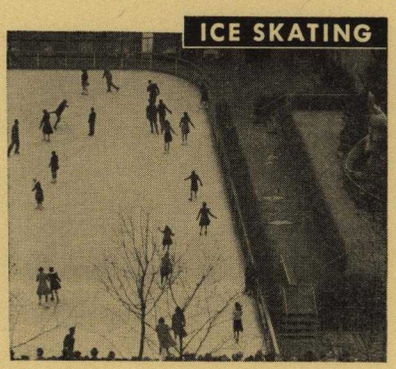
Sunnyside Beach Dance Floor, Toronto, Canada;

Cascade, Union Station, Cincinnati, Ohio;

Rockefeller Center Rink & Dance Floor, N.Y.C.;

Forest Hills Club Outdoor Dance Floor, Tampa, Fla.

A. I. A. File No. 23-E (New Number)



A Three-In-One Outdoor Terrazzo Installation—Sunken Plaza, Rockefeller Center, New York

A.I.A. File No. 23-E (New Number)

TERRAZZO RESILIENCY TESTS

THE NATIONAL TERRAZZO & MOSAIC ASSOCIATION, INC.

1420 New York Avenue, N. W., WASHINGTON, D. C.

RESILIENCY TESTS

A review of a report of the National Bureau of Standards on "Indentation and Recovery of Low-Cost Floor Coverings" (Report BMS 14-10c) reveals some interesting facts. One test was made with a rod ¼" in diameter under a load of 509 pounds per square inch. In 30 seconds, battleship linoleum indented about .018"; while under the same conditions, asphalt tile indented less than .001" or about 5% as much. Regular inlaid linoleum and rubber tile showed about the same indentation: About 30% as much as the battleship linoleum. There was no appreciable difference in the indentation for asphalt tile and for wood, which was practically nothing.

The report states that this initial indentation "is used as an approximate measure of the relative comfort value." On that basis, there is no practical or actual difference between terrazzo, wood, or asphalt tile. Here is some good ammunition to use against the false claim that asphalt tile is resilient or that wood "gives."

These tests indicate that for all practical purposes, affecting human fatigue that there is no more "give" under the heel or foot in wood, asphalt tile, or even in regular inlaid linoleum, than there is in terrazzo. With respect to resiliency, these floor coverings are **no less** tiring than terrazzo. "Easy on the feet" is only a myth and it is misrepresentation to call those materials "resilient" as these National Bureau of Standards tests prove they are not.

It is well to mention here the difference between "resilience" and "plastic flow." Resilience with respect to walking on a floor is a measure of the instantaneous yielding of the surface to the impact of the heel **and the return to the original surface.** The fact that asphalt tile and linoleum will indent under long-time pressure, such as a table leg, is no measure of its resilience.

INTERESTING FACTS ON TERRAZZO

Terrazzo laid centuries ago in Italy is still in use!

Terrazzo is not a composition, but a mixture of cement and genuine marble chips.

The beauty and endurance of terrazzo is due greatly to the skilled artisans who install the work.

Unlike other floor finishes, terrazzo **improves with age** rather than deteriorating.

Terrazzo is plastic and, therefore, is adaptable to any shape, size, or contour of surface.

Terrazzo is not only used for floors, but for wainscot, stair treads, risers, facia and stringers, toilet partitions and wash basins, and shower stall receptors.

Innumerable colors and designs are obtainable with terrazzo through the use of white cement, mineral colors, and dividing strips of metal or plastic.

The possibilities for use of terrazzo are unlimited, as the following list of installations indicate: dance floors and skating rinks, either indoors or out; public sidewalks (in one city sixteen city blocks are completely terrazzo, center promenade and sidewalk!), swimming pools, tennis courts, shuffleboard courts, and bowling alleys!

The cost of terrazzo setting, considering both installation and maintenance is the **lowest cost per foot per year** by comparison with any other material!

(See Our Catalog in Sweet's)

A.I.A. File No. 23-E (New Number)

REDUCING EXPLOSION HAZARDS IN HOSPITAL OPERATING ROOMS

THE NATIONAL TERRAZZO & MOSAIC ASSOCIATION, INC.

1420 New York Avenue, N. W., WASHINGTON, D. C.

THE anesthesia explosion danger is recognized as an important consideration in the design of operating suites. No item contributing to its prevention can be overlooked in view of the seriousness of the results of such accidents. An electrically grounded grill of metal bars in a terrazzo floor has been widely used and is now recognized by most leading hospital authorities and consultants as a necessary precautionary feature of the modern operating room suite.

* * * * *

"OPERATING ROOM CONSTRUCTION DATA"

Howard E. Bishop, Superintendent—Robert B. Packer Hospital, Sayre, Pa.—in July 1934 & May 1936 issue of "Hospital Management" says:

"Temperatures between 66 and 71 degrees and relative humidities between 30 and 70% give greatest comfort. For operating rooms the temperature is higher and a humidity of at least 55% is required to prevent the formation of a static spark where explosive anesthetic gases are used."

* * * * *

"THE HOSPITAL ARCHITECT CONSIDERS THE OPERATING ROOM"

By J. C. Murphy, F. A. I. A. of Louisville, Kentucky in "Hospital Management" Jan. 1934.

"Ordinarily a large operating room which is not used for teaching should be about 18' square. One set of sterilizers will in most cases care for two operating rooms, so the natural operating suite consists of two operating rooms separated by a sterilizer room and a scrub room.

"The floor of the room should be terrazzo joining by means of a gentle curve, a base of the same material extending 6" up on the walls. The brass strips in the terrazzo should be set very close together, 6" on centers throughout the central part of the room and be connected together securely both mechanically and electrically and the entire grillage connected to a ground. This is intended to carry off any possible charge of static electricity which may be generated by the workers in their movements about the room. This precaution is advisable where highly explosive anesthetics are to be used. From the top of the terrazzo base to the level of the tops of doors the walls should be wainscoted with tile. All corners, both internal and external, should be rounded. Having in mind the restful effect of certain colors, we would use a pale green tile for the wainscot and a somewhat darker green for the terrazzo."

* * * * *

"The Modern Hospital"—October 1930. A list of recommendations by Dr. Joseph C. Doane, M.D., Medical Director—Jewish Hospital, Philadelphia.

No. 8—The proper grounding of table, apparatus, floor and perhaps patients themselves.

* * * * *

"AN IDEAL OPERATING SUITE"

By Harold L. Foss, M.D.—Surgeon In Chief Geisinger Memorial Hospital, Danville, Pa.; and Edward F. Stevens, F. A. I. A. —Architect of Stevens Curint & Mason, Boston, Mass.

"With one of the authors, hospital architecture has been a life work; while with the other, it has been in the nature of a hobby in connection with his professional work as a surgeon. Within the past few years, in the institution with which the latter is associated, he has been called upon to plan several new operating suites. In view of their experiences "The Modern Hospital" (February 1935) has asked the authors to pool their ideas of a surgical department and to set them forth in the form of drawings with an accompanying discussion. We are, therefore, describing in this paper an ideal operating suite for a 250 bed, non-teaching hospital, (3 main operating rooms 16'6"x19'6"). Such an institution as might be needed in any community of moderate size and one in which the major portion of the hospital work of the city would be cared for. A final set of drawings was sent to six leading American surgeons for their criticism.

"All floors of the operating suite are to be set in terrazzo or ceramic tile, preferably the former, those in the anesthetizing and operating rooms being provided with a 4" brass mosaic electrically grounded to take care of all static charges, especially during the use of nitrous oxide, oxygen-ether mixtures, ethylene, and other explosive gases.

"Sanitary coves and bases in terrazzo would be specified. Operating rooms would have a flush vitrified dado extending 6' from the floor. The sterilizing rooms be tiled on walls and ceilings in neutral slate-gray color. Quite decidedly we would not specify the fantastic shades used in so many newer operating rooms."

* * * * *

Prepared for "The Hospital Yearbook" 1935 by Dr. S. S. Goldwater, Commissioner of Hospitals, New York City.

"FLOOR MATERIAL AND TREATMENT—Tile, terrazzo, marble, glass, rubber composition.

"CONSIDERATIONS—Sanitary value, safety factors, durability, comfort, maintenance, ease of repair, and relative cost.

"Grounded metal floor grid as safe guard against gas explosions.

"The principal measure heretofore recommended to counteract this risk has been the grounding of the anesthetic apparatus. This, however, is probably of little value unless there are metal strips in the floor which are also grounded. Even this precaution gives at best only an incomplete protection, for the most serious explosions are probably initiated by electrical discharges of static electricity developed inside the anesthetic apparatus itself. Grounding the apparatus considerably increases the danger of a short circuit from the electrical illuminating current to the patient, the surgeon and the anesthetist."

* * * * *

In the presence of inflammable and explosive gas mixtures, all possible sources of ignition must be eliminated. The spark of static electricity is a definite ignition source as it has a high temperature. Static charges are an ever-present danger as they are inevitably created by movements of the air, gases, equipment, and operators. Charges of several thousand volts may easily be collected in many different ways if there is no means of dissipation. There are so many combinations of factors that are dangerous that any device—such as the grounded terrazzo floor grill—that will minimize these is indispensable. A difference of potential sufficient to cause a spark can not be set up when the charges are led off through the highly efficient metal bar conductors. The small cost of such a metal grill urges its inclusion.

"PLANNING THE OPERATING SUITE"

By Louis Burlingham, M.D., Superintendent Barnes Hospital, St. Louis, Missouri; Wilbur Trueblood, Architect & Evarts A. Graham, M. D., Surgeon In Chief Barnes Hospital. In the bulletin of the American Hospital Association, January 1934, page 61.

"FLOORS"—"The floors in the operating room are of terrazzo which is treated with wax with a coved base to protect the walls

from being injured. They contain a brass grill of 6" mesh to care for static electricity. However, in one room where electrical instruments are much used, it was found necessary to place a rubber mat on the floor to avoid shocks."

* * * * *

"Hospital Management"—March 1932. An article by Charles S. Cole, Superintendent Sibley Memorial Hospital, Washington, D. C.

"The operating unit consists of four major operating rooms, two minor operating rooms and a fracture room. This part of the building together with the doctors' rest room and the nurses' work room is artificially cooled and ventilated and humidified. It is possible to change the air in every operating room once a minute. This system not only makes the work of the surgeon more comfortable; but is added protection to the patient in that all perspiration is constantly removed from the surgeon's face and the danger of explosions from anesthetic gases is greatly minimized. It also prevents dust from coming into the room.

"The floors of the operating rooms are grounded by 4" copper strips running each way so that all static electricity is constantly removed."

"It is suggested in this report that the accumulation of charges of static electricity within the apparatus or on persons coming near to it may be prevented by the humidification of the air in the operating room to more than 50 per cent moisture content and by the electrical grounding of the anesthetic apparatus, the operating table and so far as possible the floor of the operating room. The effect of humidifying the air of the operating room is to render the surfaces of the anesthetic apparatus capable of conducting any electrical charge that may develop. The charges of electricity are thus allowed to leak away before potentials high enough to cause a spark can be built up. It has been found that a humidity of about 54 per cent is capable of bringing this about. One disadvantage of this practice is, of course, the creation of extreme discomfort to surgeons and their assistants during warm weather."

* * * * *

Most designers recognize the grounded metal grill as being of primary importance and a good, low-cost insurance against static sparks. The grounded grill's effectiveness is increased in a humidified atmosphere and serves as an effective complement to that safety measure. It provides a facile means of grounding equipment and operators through the commonly practised use of conductive mesh, chains, and spiral wires trailed on the grounded terrazzo floor.

* * * * *

"Anesthesia Hazards of the American Hospital Association Library Service" covers the subject quite well by means of quotations from the "Journal of the American Hospital Association," "Hospital Management" August 1935, "The Modern Hospital" September 1934, and a special article entitled "The Hazard of Explosion of Anesthetics" which is the report of the committee on anesthesia accidents given in the Journal of the American Medical Association May 10, 1930 and March 29, 1930, "Hospital Management" February 1931, "The Modern Hospital" October 1930, and "Journal A. N. A." May 10, 1930.

"The grounding of anesthetic apparatus by connecting a wire to it and to a water pipe is a common arrangement. Those who use it generally consider that it has contributed to their immunity from explosion. But this confidence is probably unfounded, for operating rooms in which there is no such arrangement also usually escape explosion. A more complete protection against the hazard of static electricity is adopted in some operating rooms where metal strips have been inserted in the surface of the floor. These strips are grounded and any one stepping on them, unless he wears rubber soled shoes, is relieved of any charge that the shuffling of his feet or the friction of his clothing may have accumulated. If contact is made between the anesthetist, the patient and the anesthetic apparatus before the anesthetic is turned on, the risk of sparking at this time is largely eliminated as McKesson has suggested."

* * * * *

U. S. VETERANS ADMINISTRATION'S SPECIFICATIONS

"Divider Strips for Metallized Terrazzo floors shall be run parallel to walls and shall divide floors into 6"x6" squares. Strips shall be not less than 1/16" thick, not less than 3/4" high, and slotted to a 3/8" depth. The strip at toe of base shall be the same type as for metallized floors. All metal strips for field shall interlock and be securely soldered together at each intersection and at each joint of field strips with strips at toe of base so as to form a positive electrical connection. In each room and corridor near the four corners and at centers, provide an approved bare copper conductor wire of No. 6 B&S gage or equivalent copper strip and securely solder same to floor divider strips. Wires shall be passed through perforations in the structural slab and properly grounded electrically to the nearest cold water pipe with approved ground clips. The terrazzo thresholds at door openings separating corridors or rooms having metallized terrazzo floors shall be provided with similar metallized strips and divided into panels as specified for metallized floors. Two corners of each threshold panel shall be grounded electrically to each adjacent metallized floor field by similar wires or strips as hereinafter specified." N. B. The Association recommends solid section strips.

* * * * *

The widespread use and satisfactory service of durable and sanitary terrazzo floors in hundreds of operating and anesthesia rooms covering many years indicates that it is to be even more favored since it lends itself to the use of a grounded grill far better than any other acceptable material—at a much lower cost.

A FEW OF THE MANY GROUNDED GRILL TERRAZZO FLOORS

Location	*Hospital*	*Location*	*Hospital*
Champaign, Ill.	Birmingham	Pittsburgh, Pa.	Woodville
Memphis, Tenn.	John Gaston	Pittsburgh, Pa.	Alleghany
New York City	Doctors	Cincinnati, Ohio	General
New York City	New York Orthopedic	Milwaukee, Wis.	U. S. Veterans
Brooklyn, N. Y.	Brooklyn	Columbia, S. C.	U. S. Veterans
Worcester, Mass.	City	Bronx, N. Y.	U. S. Veterans
Rapid City, S. Dak.	Sanitarium	Roseburg, Oreg.	U. S. Veterans
Sisseton, S. Dak.	Indian	Chillicothe, Ohio	U. S. Veterans
Torrington, Conn.	Hungerford	Palmyra, N. Y.	U. S. Veterans
Seattle, Wash.	Harbor View	Waltham, Mass.	Waltham
Boonville, Mo.	State	In U. S. & Canada	Many Others

REPORT OF CONDUCTIVITY TESTS ON SAMPLES OF TERRAZZO FLOORS

By CLARENCE G. STONE, E. E., A. M., Consulting Engineer
Broadway and 120th Street, New York City

Object of Test:

The purpose of these tests was to determine the electrical resistance of various samples of terrazzo floors as measured between an electrode placed on the surface and an imbedded brass mesh or imbedded brass grille.

Reason for Tests:

The importance of carrying off to a suitable ground, the static electric charges which may occur in operating suites of hospitals is well known to all of those familiar with the subject. For a number of years, terrazzo floors have been in use in which a metal grille with exposed metal was imbedded. The use of a brass or copper mesh imbedded in the terrazzo floor has recently been recommended for grounding static electricity. It was desired to compare these two systems of grounding by determining the resistances offered by each to ground.

Method of Test:

Samples: (A) A 12"x12" piece of terrazzo, 2" thick had imbedded in it, so that the strips were level with the finished surface, 1/8 inch brass strips, 3/4 inch deep, slotted and soldered so that the entire unit of brass was in electrical contact. The strips were spaced 6" on center and the sample was four months old when the tests were run. It received no treatment after fabrication except periodical washing of the surface with water similar to mopping of a floor. The terrazzo topping was 3/4 inch deep. The terrazzo mixture was 70% marble and 30% cement by weight.

(B) A 12"x12" piece of terrazzo, 2 inches thick had a brass mesh imbedded in it, 1/2 inch below the surface. The mesh was .028" thick and was made with 8 squares to the inch. It received no treatment after fabrication except periodical washing of the surface with water similar to mopping of a floor. The terrazzo topping was 1/2 inch deep. The terrazzo mixture was 60% marble and 40% cement by weight. The sample was 9 days old when the tests were run.

(C) A 12"x12" piece of terrazzo, 2 inches thick had a brass mesh imbedded in it, 3/4 inch below the surface. The mesh was .028" thick and was made with 8 squares to the inch. It received no treatment after fabrication except periodical washing of the surface with water similar to mopping of a floor. The terrazzo topping was 3/4 inch deep. The terrazzo mixture was 60% marble and 40% cement by weight. The sample was 9 days old when the tests were run.

(D) A 12"x12" piece of terrazzo, 2 inches thick had a brass mesh imbedded in it, 1 1/2 inches below the surface. The mesh was .028" thick and was made with 8 squares to the inch. It received no treatment after fabrication except periodical washing of the surface with water similar to mopping of a floor. The terrazzo topping was 3/4 inch deep. The terrazzo mixture was 60% marble and 40% cement by weight. The sample was 4 months old when the tests were run.

Procedure:

It was thought that an area of 9 square inches in the form of a square 3 inches on a side would be representative of the area of contact of a shoe with the floor. Thus a 3"x3" piece of tin foil approximately .010 inch thick was used for the electrode in each test. In order to insure good contact with the surface a 3"x3" piece of brass 3/16" thick was placed over this on top of which was placed a 52 lbs. weight.

The positive connection was made to the brass plate and the negative to the mesh in the mesh samples and the grille in sample A. Between these two points was connected a 45 volt B-battery and a four range Weston Milliameter in series. The most sensitive range was 200 microamperes full scale, the instrument resistance being only 10 ohms.

On the mesh samples four different measurements of each were made at positions two inches apart. On the grille sample the measurement was made at the center of the 6 inch grille, as well as on the metal grille itself. Tests were run approximately 15 minutes after the last wetting.

Measurements:

SAMPLE	RESISTANCE
A. 1/8" brass grille 6" o. c. 70% marble, 4 months old	Contact with brass grille 0.06 Ohms
	Contact with terrazzo only 860,000 Ohms
B. Brass mesh 1/2" down 60% marble, 9 days old	Contact at 4 portions of the terrazzo
	537,000 Ohms
	537,000 "
	1,070,000 "
	717,000 "
C. Brass mesh 3/4" down 60% marble, 9 days old	Contact at 4 portions of the terrazzo
	410,000 Ohms
	165,000 "
	95,000 "
	537,000 "
D. Brass mesh 1 1/2" down 60% marble, 4 months old	Contact at 4 portions of the terrazzo
	4,780,000 Ohms
	14,300,000 "
	6,150,000 "
	14,300,000 "

Results:

1. It was found that the conductivity in all cases varied from place to place and that on duplication of tests at the same spaces, the readings varied when measured on the terrazzo surfaces.

2. In only one case namely that of the third reading on sample C was the resistance low enough so that it might be considered passable and that only at one place on the sample. Since this sample was only 9 days old it is probable that there was more water present than would normally be the case after months of drying.

Conclusions:

1. It would appear from these tests that brass mesh imbedded in the terrazzo will not form a ground of sufficiently low resistance to be relied upon for the satisfactory carrying off of static charges.

2. The only satisfactory ground tested was obtained by the use of the brass grille, where contact was made directly with the exposed metal portion.

3. If the metal portion of the grille is not contacted, a satisfactory ground is not obtained.

Recommendations:

1. In order to be certain of contact with the metal, it would be best to use brass grilles 4"x4" instead of the 6"x6" which has been recommended in the past. The metal should not be less than 1/16" thick in order to insure good contact and the joints should have good electrical contact which is best secured by soldering every joint.

2. Since there is always a possibility of an electrical shock due to faulty electrical apparatus, it would probably be desirable to have the grille system grounded through a suitable known resistance. This could be located so that it could be easily removed for test or replacement as the case might be. The resistance should be high enough in value so as to prevent a dangerous current from passing through a person in the case of an electrical shock, and at the same time low enough to allow the escape of static electricity to the ground rapidly enough to prevent accident hazards.

Respectfully submitted,

April 1st, 1941 CLARENCE G. STONE.

DIVIDER STRIP LOCATION AND DATA

THE NATIONAL TERRAZZO & MOSAIC ASSOCIATION, INC.

1420 New York Avenue, N. W., WASHINGTON, D. C.

The Purpose of Dividers in terrazzo is to control and localize setting shrinkage and to localize flexure cracks when they occur. Cracks in terrazzo are caused by structural settlement, by expansion and contraction, or by vibration. Crazing or cracks from shrinkage do not occur in properly laid terrazzo. The shrinkage of terrazzo is largely governed by the installation technique and by the rate of evaporation from the surface. Thorough and sufficient rolling is necessary to minimize shrinkage and prevent crazing. Proper curing methods will check evaporation. Correctly located dividers will eliminate promiscuous cracking. When cracks do appear, they *can* be inconspicuously, even artistically, patched at a reasonable cost with a special white cement now being used. Details on this method of patching are available on request. Cracked panels can be replaced if necessary.

The Floated Type of Terrazzo Floor construction is affected less by structural movements. It is recommended when the use of the deeper sub-bed is warranted as insurance against cracks: as in pattern work, lobbies, corridors, and areas where a desired appearance is important. The sand cushion and paper method is the most effective.

In Pattern Work, plan the layout of the lines of divider strips to form blocks or the usual-sized panels. Use reinforcing mesh cut to the size and shape of these panels and placed well up in the sub-bed. Inconspicuous colored dividers may be used where needed to carry these main divisions through patterns. Concealed felt expansion joints may be used where the installation indicates such a precaution. Pre-assembled units dividing only the terrazzo topping are made up for patterns and decorative work; as are letters, numbers, designs, etc. The preparation of such work is best accomplished in the shop of the divider manufacturers who have equipment and men trained to do it accurately.

Carry a Line of Division Through to the wall, unless special provisions are made. Do not let the line of division die out in the field or at a border; but continue it through to the wall or to the edge of the terrazzo. Failure to do this has resulted in much cracking that is entirely needless. Always carry a divider out through the border from a column or pilaster corner. Where wall base is used, the dividers in it serve best when on the line of a floor division. It is a common practice to place them opposite alternate floor strips.

Locate the Dividers at Critical Points to localize and control the crack if and when movement occurs. Such points are tension areas over beams, girders, supporting walls, columns, and around stair openings. Where an expansion joint occurs or the type of construction changes, always use a divider; and a special type may be needed to provide for the almost certain movement. Whenever feasible, place dividers at points where there is a probable change of stress due to rigidity as at the edges of a beam tee or a dropped column head. An effort to anticipate the lines of probable opening is worth while. Place dividers on these lines, whenever possible, to serve as bases for the balance of the layout. Diagonal layouts are not recommended.

Panel Size is dependent on several factors, such as: room size and shape, proposed use of the area, importance of the floor cost, importance of appearance, and decorative consideration. Reasonably small panels are preferable, even though they cost slightly more. Panels of 16 in. to 30 in. are common in the floors of lobbies, corridors, and public spaces; while stores, commercial work, hospital and institutional rooms, rental and office areas are usually laid in panels ranging from 24 in. up to 50 in. in size.

Wall Base, Borders, and Wainscots must be divided. Base and border divisions are mentioned above in the fourth paragraph. Sections ought not to exceed 5 ft.-0 in. or a 6 ft.-0 in. maximum. Wanscots should be divided both horizontally and vertically into panels not over 30 in. Small panels are preferable. Shaped dividers for various type of base are stock items, as are strips for wainscots.

Base Beads and Shelf Type Strips are stock items in the same materials used for the floor strips. The beads serve economically as a ground in either flush or projecting types and harmonize in appearance. The shelf type strip is recommended where terrazzo adjoins linoleum or a similar type of floor as it insures a flush joint.

Grounded Grills for floors of hospital operating suites are made in small panels (6 in. is the most popular size) of metal strips (¾ in. x ⅛ in. solid section is recommended)—interlocked, soldered, and electrically grounded. This type of terrazzo floor is recognized as an effective precaution against explosion from static spark. We will send a bulletin and specifications on this upon request.

Dividers Are Made in a Variety of Sizes. Exposed face thicknesses range up from 20 Brown & Sharpe gage (18 gage is a recommended minimum) to heavy bars. Dividers of ⅛-in. face and wider are usually of the heavy-top type. A 1¼-in. depth divider is recommended for the usual floor thicknesses. Narrow strips are available for special thin floors, borders, wainscots, etc. Standard length of metal floor dividers is 6 ft.-0 in.; of composition dividers 5 ft.-0 in. Special lengths can be mill or factory cut.

The Most Commonly Used Materials for dividers are half-hard brass and a white metal (zinc) alloy. Nickel-silver is available. Dividers of tempered plastics are made in various colors.

The Anchorage Features incorporated in the dividers are usually more than ample. The divider must function as such and must have sufficient surface to create a line of cleavage in the terrazzo. A continuous lower edge cutting the sub-bed is a needed feature.

The Proper Use and Location of Dividers will effectively control and localize such cracks as may occur in terrazzo through the exertion of outside forces that crack or deform any relatively inflexible finishing material. Cracking is not inherent to terrazzo properly laid out and installed.

See Our Catalog in Sweet's

TERRAZZO MAINTENANCE

THE NATIONAL TERRAZZO & MOSAIC ASSOCIATION, INC.

1420 New York Avenue, N. W., WASHINGTON, D. C.

THE physical characteristics of terrazzo—or any flooring materials—must govern the methods and selection of materials for properly treating and cleaning it. Good terrazzo has a smooth surface that is 70% or more of marble, and less than 30% of neat Portland cement matrix. The marble granule is practically non-absorbent. The porosity of the matrix and its ratio of absorption are relatively low.

Suitable materials for treating or cleaning terrazzo floors will fill the original pores or have no effect on them. Harmful materials increase the number and enlarge the pores. Continued use of such harmful materials increases the maintenance problem and cost.

Terrazzo is benefited by a penetrating (not surface) filler or seal. The urgency for the need of such a penetration treatment varies with the floor. This Association recommends that the use of purely surface waxes, varnish preparations, and "good-for-anything" materials be avoided.

New terrazzo, when not given a special treatment, often has a dull, gray appearance. This is caused by a deposit of efflorescent, mineral salts that are a by-product of the setting and curing of the Portland cement. This chemical action continues at a decelerating rate over a period of months, unless the pores of the terrazzo are sealed. This is a normal condition and the deposit is removable by the regular maintenance operations.

New terrazzo and mosaic floors should be scrubbed two or three times a week, and mopped on alternate days. The cleansing agents must be free from alkali, acids, or other strong ingredients that may ruin the floor. The floor must be rinsed after each washing to prevent it from becoming slippery. After two or three months of this treatment, the floor will acquire a beautiful, natural sheen and will require less work for its upkeep.

Terrazzo does not need an artificial or applied surface. Its sheen and lustre are entirely natural. Properly laid terrazzo in its natural condition is a lifetime installation and needs only simple care to preserve its attractive appearance. Artificial or applied surfaces often create or contribute to slipperiness which is not an inherent quality of terrazzo.

Clean terrazzo is not slippery. The factors of slipperiness are the same as those encountered on any smooth surface; principally surface films such as wax, water, oil. A residual film of cleaning material is a common cause of slipperiness. When dirty water and solutions are allowed to dry on terrazzo, they form a film that dulls the appearance and natural color. A gummy or hardened accumulation of this film is often seen along the edges of a floor and a dirty streak is far too common on the wall base. When a heavy film is permitted to form through failure to properly gather up and rinse off dirty water, special work and materials are required to remove it.

Such work must be done by experienced men who can be trusted to handle the strong cleaners and the abrasive materials necessary without damaging the terrazzo. When the terrazzo has been restored to its natural, clean condition, only a little directed effort is needed to avoid the recurrence of film. The correct maintenance methods that do not damage the terrazzo and that maintain its natural beauty, actually cost the least over a period of time.

Low-cost maintenance is a primary consideration to every owner. Many building owners install terrazzo because of this and fail to get it because they are misled into using some cheap, unsuitable material which has a low pound or a low gallon price. The Association's standard specification warns that "soaps and scrubbing powders containing caustic alkali should never be used in the maintenance of terrazzo and mosaic surfaces." Labor is about 95 per cent of the cleaning cost. The difference in cost between cheap and good materials has almost no effect on your total maintenance bill. The cost of special care or the services of experienced men needed because of the use of poor materials far offsets the savings in cost—without considering the appearance and deterioration of your floor.

The proper methods for maintaining the appearance and service of terrazzo floors are very simple: If you seal or give a special treatment to your terrazzo, do it immediately following the installation or following a thorough cleaning so as not to seal in dirt or film. For suitable sealing material, consult any terrazzo contractor.

Mop the floor as frequently as the amount and type of traffic demands. Use a good, neutral cleaner or scouring cleaner solution containing the least amount of cleaner that experience demonstrates is sufficient to loosen the dirt. Remove the dirt and the dirty water and rinse the terrazzo clean.

CAUTION: Sweeping compounds containing oil will penetrate and permanently discolor terrazzo.

Thoroughly and vigorously scrub terrazzo at the intervals determined by observing the effectiveness of mopping. The surface should be completely cleaned of all film. Stronger cleansers or abrasives are permissible for these occasional scrubbings, only if found to be necessary.

the *Only* floor that improves with age

Terrazzo is the only floor that actually looks better as it grows older. Years of heavy foot wear mellow and blend the colors. It's a "lifetime" floor—no costly painting, refinishing, no expensive repairs, no continuous, expensive waxings or coatings. It's the floor with no upkeep cost, with a warm inviting beauty. Practically non-absorbent, terrazzo gives the utmost in cleanliness and can harbor no germs. In terrazzo you can have any color or combination of colors or designs, even to pictorial or geometric motifs. Are you about to build? Are you going to remodel? Then look into the advantages of terrazzo, the floor that improves with age. Write today for latest, up-to-date information.

THE NATIONAL TERRAZZO AND MOSAIC ASSOCIATION

1420 New York Avenue, N. W., Dept. F • Washington, D. C.

Terrazzo Floors **LOWEST COST PER FOOT PER YEAR**

This advertisement appears in
Chain Store Age, Administration Edition, July, 1941.

THE NATIONAL TERRAZZO AND MOSAIC ASSOCIATION

1420 NEW YORK AVENUE, N. W. WASHINGTON, D. C.

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A. Corradini & Sons, 4880 Valley Blvd., Los Angeles.
Venetian Terrazzo & Mosaic Co., 4827 Hunting Drive, Los Angeles.
Thomas H. Price Co., 2026 Lombard St., San Francisco.

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Columbia Mosaic & Tile Co., Inc., 114 C St., N. W., Washington.
Standard Art Marble & Tile Co., 117 D St., N. W., Washington.
U. S. Tile & Marble Co., Inc., 2020 Ga. Ave., N. W., Washington.

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American Terrazzo & Tile Co., 1915 N. W. Miami Ct., Miami.
Dade Marble & Tile Co., 128 N. W. 25th St., Miami.
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Central States Terr. Corp., 3715 So. St. Louis Ave., Chicago.
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Roman & Co., Inc., 2126 South Spaulding, Chicago.
Northern Illinois Terrazzo & Tile Co., 1117 N. 2nd St., Rockford.

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Sioux City Mosaic Co., Box 303, Sioux City.

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American Mosaic & Tile Co., 331 E. Broadway, Louisville.
Keno Rosa Co., 524 S. Brook St., Louisville.
Rosa Mosaic & Tile Co., 323 E. Broadway, Louisville.

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Rizan Terrazzo Co., 730 Independence, New Orleans.

MASSACHUSETTS—Zone 1

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Bruny Bros., 4758 Grand River Ave., Detroit.
Gibraltar Floors, Inc., 48 W. State Fair Ave., Detroit.
Flint Mosaic Tile & Terrazzo, Inc., 3490 S. Saginaw St., Flint.
Grand Rapids Tile & Mosaic Co., 1039 Division Ave., Grand Rapids.
John B. Rossi Co., 563 Grandville Ave., Grand Rapids.
Central Tile & Terrazzo Co., 112 W. Elm St., Kalamazoo.
D. Valentine Bros., 219 S. Eighth St., Lansing.
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Sani-Stone Products Co., Inc., 214 S. 21st Ave., W. Duluth.
Grazzini Bros. Co., 620 16th Ave. South, Minneapolis.
Northwestern Marble Corp., 27th Ave. & 27th St., S., Minneapolis.
Venice Art Marble Co., 3158 Snelling Ave., Minneapolis.
American Terrazzo Co., Pillsbury & Vandalia, St. Paul.
Drake Marble Co., 58 Plato Ave., St. Paul.
National Terrazzo Co., 556 Prior Ave. No., St. Paul.

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Arthur Girolami Terrazzo Co., 4707 Lewis Place, St. Louis.
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Missouri Terrazzo Co., 3859 Delmar Blvd., St. Louis.
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V. Foscato, Inc., 40th Ave. & 22nd St., Long Island City.
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Anthony Mion & Son, Inc., 428 Michigan Ave., Schenectady.
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O. A. Bertin Co., 3908 Behrwald Ave., Cleveland.
Interior Marble & Tile Co., 4404 Euclid Ave., Cleveland.
Ardit Mosaic Tile & Marble Co., 667 W. Mound St., Columbus.
Venetian Marble Mosaic Co., 46 Hudson St., Tiffin.
Art Mosaic & Tile Co., 216 Sycamore St., Toledo.

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Pete Cozzi Terrazzo & Mosaic Co., 9th & Midland Valley Tracks, Tulsa.

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Patrizio Art Mosaic Co., 2022 Fifth Ave., Pittsburgh.

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The O'Neil Co., Ltd., 787 Hornby St., Vancouver; Zone 5.
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Industrias, "Vikora" Apartado 1881, Caracas, Venezuela.
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Salt River Cement Works (South Africa), P. O. Box No. 846, Cape Town.
Union Cement Works (South Africa), Treaty Rd., Woodstock, Cape Town.

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